

CLAIMS

1. A valve timing control device comprising:

5 a fuel injection valve for injecting fuel into an intake port in an internal combustion engine;

an intake speed adjustment mechanism for varying the speed of an intake inflow from the intake port to a cylinder;

an exhaust adjustment mechanism for varying the valve timing of an exhaust valve;

10 intake speed increase means for exercising control so as to place the intake speed adjustment mechanism in a high-speed state for raising the speed of an intake inflow; and

exhaust valve closing timing retard control means for
15 exercising control so that an exhaust valve closing timing coincides with a retarded valve closing timing, which is retarded from a normal valve closing timing, in a situation where the intake speed adjustment mechanism is maintained in the high-speed state.

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2. The valve timing control device according to claim 1, wherein the intake speed increase means exercises control so as to place the intake speed adjustment mechanism in the high-speed state in a situation where the internal
25 combustion is not completely warmed up;

wherein the normal valve closing timing is an exhaust

valve closing timing that is normally used after the internal combustion engine is warmed up; and

wherein the exhaust valve closing timing retard control means exercises control so that the exhaust valve closing timing coincides with the retarded valve closing timing in a situation where the internal combustion engine is not completely warmed up and the intake speed adjustment mechanism is maintained in the high-speed state.

3. The valve timing control device according to claim 1 or 2,

wherein the intake speed adjustment mechanism includes an intake adjustment mechanism for varying the valve timing of an intake valve; and

wherein the intake speed increase means includes intake valve opening timing retard control means, which raises the speed of an intake inflow by exercising control so that an intake valve opening timing coincides with a retarded valve opening timing after an exhaust top dead center.

4. The valve timing control device according to any one of claims 1 to 3,

wherein the intake speed adjustment mechanism includes an intake adjustment mechanism for varying the lift amount for the intake valve; and

wherein the intake speed increase means includes intake lift amount control means, which raises the speed of an intake inflow by reducing the lift amount for the intake valve.

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5. The valve timing control device according to any one of claims 1 to 4, wherein the intake speed increase means includes high-speed state setup means, which varies the high-speed state so as to increase the speed of an intake inflow when a warm-up process for the internal combustion engine progresses.

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6. The valve timing control device according to any one of claims 1 to 5, further comprising:

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retarded valve closing timing setup means, which varies the retarded valve closing timing in advancing direction when the warm-up process for the internal combustion engine progresses.

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7. The valve timing control device according to any one of claims 1 to 6, wherein the retarded valve opening timing and the retarded valve closing timing are such that an overlap is generated between intake valve opening period and exhaust valve opening period.

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8. The valve timing control device according to any

one of claims 1 to 4,

wherein the internal combustion engine includes a plurality of exhaust valves for each cylinder; and

5 wherein the exhaust adjustment mechanism has a function for adjusting the valve timings of the plurality of exhaust valves for each cylinder on an individual basis,

said valve timing control device comprising:

partial stop request judgment means for judging whether a request for stopping some of the plurality of
10 exhaust valves is generated, and

exhaust valve control means, which, when the stop request is recognized in a situation where the intake speed adjustment mechanism is maintained in the high-speed state, operates all the exhaust valves while ensuring that the valve
15 opening timings for some exhaust valves are retarded from the valve opening timings for the other exhaust valves.